20 have been amended to recite diodes rather than floating lateral clamp diodes, while claims 34-35 have been amended to more precisely recite the invention. New claim 37 has been added. Support for new claim 37 can be found on page 36, lines 17-20.

The Examiner rejected claims 1 and 18 under 35 U.S.C. §112, first paragraph. Claim 1 recites, in part,

> "the second region . . . being formed so that the top surface of the second region encircles the top surface of the well that encircles the top surface of each first region."

Claim 18 recites similar limitations.

In rejecting the claims, the Examiner argued that although it is possible for the second region to encircle part of the well, it is impossible for the second region to be formed in the well and encircle the whole well.

Applicant respectfully notes, however, that the Examiner is disregarding the phrase "that encircles the top surface of each first region." This phrase defines the parts of the well that are encircled by the second region.

As a result, the claims do not recite that the second region encircles the whole well. Rather, the well encircles each first region, and second region encircles those portions of the well. Thus, claims 1 and 18 are believed to satisfy the requirements of the first paragraph of section 112.

The Examiner rejected claims 11, 21, and 34 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites, in part,

> "the third region . . . being formed in the first region so that the top surface of the third region encircles the top surface of the first region that encircles the top surface of each second region."

Claim 21 recites similar limitations.

In rejecting the claims, the Examiner noted that it is unclear how a third region can be formed in a first region, and yet encircle the first region.

As with claims 1 and 18, the Examiner is disregarding the phrase "that encircles the top surface of each second region" required by claims 11, 21, and 34. This phrase defines the parts of the first region that are encircled by the third region.

As a result, the claims do not recite that the third region encircles the whole first region. Rather, the first region encircles each second region, and third region encircles those portions of the first region.

With respect to claim 34, this claim has been amended to depend from claim 33. Thus, claims 11, 21, and 34 are believed to satisfy the requirements of the second paragraph of section 112.

The Examiner rejected claims 1 and 5 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. (U.S. Patent No. 5,515,225) in view of Rao (U.S. Patent No. 5,770,886). For the reasons set forth below, applicant respectfully traverses this rejection.

As noted above, claim 1 recites, in part,

> "the second region . . . being formed so that the top surface of the second region encircles the top surface of the well that encircles the top surface of each first region."

In rejecting the claims, the Examiner noted that Gens does not teach the structure of the diode, but argued that the Rao reference teaches the required structure. With respect to Rao, the Examiner pointed to n-type tub 26 as constituting the well of claim 1, p+ wells 35 and 36 as constituting the first regions of claim 1, and n+ well 42 as constituting the second region of claim 1.

As noted in the amendment filed on August 15, 2000, Applicant has been unable to find any discussion in Rao that teaches or suggests that the top surface of n+ region 42 shown in FIG. 2 of Rao encircles the top surface of well 26 that encircles the surface of each p+ well 35 and 36.

In response, the Examiner pointed to second regions 40 and 108 of FIGs. 3 and 9 of Rao as encircling wells 26 and 111.

With respect to FIG. 3, Rao teaches that both p+ type region 34 and n+ type well 40 are circular shaped. (See column 7, lines 14-18 of Rao.) Thus, although n+ type well 40 encircles p+ type region 34, n+ well 40 encircles only a single p+ type region 34.

In contrast, claim 1 requires that the second region (n+ well 40) encircle a plurality of first regions (p+ regions 34). (This is an implicit requirement in that the second region (n+ well 40) encircles the top surface of the well that encircles the top surface of each of the plurality of first regions (p+ regions 34)).

Thus, since Rao fails to teach that n+ well 40 encircles a plurality of p+ regions 34, the Rao reference fails to teach the diode limitations required by claim 1.

With respect to FIG. 9, applicant respectively does not understand the argument made by the Examiner. FIGs. 1 and 6 of Rao show a diode 11 which the Examiner pointed to as constituting the diodes of the claims. FIG. 2 of Rao shows a cross-sectional diagram of diode 11 in FIG. 1.

FIG. 6 of Rao, in addition to showing diode 11, also shows an ESD structure 101. FIG. 7 of Rao represents the ESD device 101 shown in FIG. 6. FIG. 9 of Rao is a cross-sectional diagram that illustrates a portion of FIG. 7. Thus, FIG. 9 shows a structure which is different from the diode shown in FIG. 2 of Rao.

Further, applicant can find no teaching in FIG. 9 that shows that the top surface of n+ buried layer 108 encircles any part of the top surface of n-well 111. In addition, it is unclear to applicant what the relationship is between n+ buried layer 108 or n-well 111, and n+ region 42.

Thus, since Gens and Rao fail to teach or suggest a second region that is formed so that the top surface of the second region encircles the top surface of the well that encircles the top surface of each first region, claims 1 and 5 are patentable over Gens in view of Rao.

The Examiner also rejected claims 10-11 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of Rao. For the reasons set forth below, applicant respectfully traverses this rejection.

Claim 10 recites, in part,

> "a first region of a second conductivity type formed in the well."

In rejecting the claims, the Examiner pointed to n-type tub 26 in FIG. 2 as constituting the well of

claim 10, and n-well 111 of FIG. 9 as constituting the first region of claim 10. Although unclear, the Examiner appears to be equating n-well 26 of FIG. 2 with n+ buried layer 108 of FIG. 9.

As noted above, however, FIG. 2 and FIG. 9 of Rao are directed to entirely different structures. In addition, as shown in FIG. 9 of Rao, n-well 111 is not formed in n+ buried layer 108, but instead is formed on n+ buried layer 108.

Further, one skilled in the art would not be motivated to form an n+ buried layer, such as n+ buried layer 108, under n-type tub 26 to provide better electrical isolation to the devices as suggested by the Examiner. This is because well-known double well configurations that are used to provide better isolation require the two wells to have, in addition to the proper biasing, different conductivity types.

Thus, in view of the above, claims 10-11 are patentable over Gens in view of Rao. (Applicant notes that the dopant concentration limitation of claim 10 in the amendment filed on August 15, 2000 incorrectly reflects the language of the claim as originally filed. This inadvertent error has been corrected so that the first region element of claim 10 of the present amendment correctly matches the language of the originally filed claim 10.)

The Examiner further rejected claims 6, 15, 19, 22-23, and 32-36 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of Bass Jr. et al. (U.S. Patent No. 6,086,627) and the admitted prior art (APA). For the reasons set forth below, applicant respectfully traverses this rejection.

With respect to claims 6, 32-36, and new claim 37, these claims depend either directly or indirectly

from claim 1. Applicant, however, has been unable to find any discussion in Gens, Bass, or the APA that teaches or suggests the diode limitations required by claim 1. As a result, claims 6, 32-36, and new claim 37 are patentable over Gens in view of Bass and the APA.

With respect to claim 15, this claim recites, in part,

> "an electrostatic discharge (ESD) negative ring;
> "a plurality of ESD positive lines, the plurality of positive lines not being connected to a steady voltage; [and]
> "a plurality of ESD switches connected to the ESD positive lines and the ESD negative ring so that each positive line is connected to the negative ring via an ESD switch." [Bracket added.]

In rejecting the claims, the Examiner pointed to bus R2 shown in FIG. 2 of Gens as constituting the negative ring of claim 15, and bus R1 as constituting the positive line of claim 15. Thus, although Gens shows a bus R1 and a bus R2, Gens does not show a plurality of buses R1 with a bus R2.

In further rejecting the claims, the Examiner pointed to FIG. 7 of Bass as teaching a plurality of ESD protection devices connected to a multiplicity of power supplies. The Examiner also pointed to applicant's specification as teaching a plurality of switches connected between a single power supply line and ground.

The Examiner then argued that it would have been obvious to connect a plurality of the ESD protection devices from Gens to each power supply source in a circuit having a plurality of power supply sources.

Applicant respectfully does not understand the argument made by the Examiner. Applicant does not know which structures the Examiner is referring to as the ESD protection devices from Gens. Applicant assumes that the ESD protection devices from Gens that the Examiner is referring to are a diode D1, the clipping device Z, and a diode D2.

However, as shown in FIG. 2, Gens teaches that a diode D1 and a diode D2 are connected to a power supply voltage VDD1, and a diode D1 and a diode D2 are connected to a power supply voltage VDD2. Diodes D1 and D2, in turn, are connected to clipping device Z.

Thus, it would appear that the ESD protection devices of Gens are connected to each power supply source in a circuit having a plurality of power supply sources. The Examiner, however, has not indicated why this would motivate one skilled in the art to use multiple buses R1 which, as required by claim 15, can not be connected to a steady voltage source. As a result, the Examiner has not established a prima facia case of obviousness.

The Examiner also argued that it would have been obvious to connect the plurality of ESD switches in Gens to a plurality of positive lines and a negative ring to provide unidirectional current flow during ESD operation.

Applicant respectfully does not understand the argument made by the Examiner. As noted in column 3, lines 50-54, Gens teaches that an ESD pulse between any of the pads or any of the high or low power supply pads will pass through a diode D1, clipping device Z, and a diode D2. Thus, Gens teaches that the current flow in FIG. 2 is always unidirectional during ESD operation.

The Examiner, however, has not indicated why the unidirectional current flow of the circuit in FIG. 2 of Gens would motivate one skilled in the art to use multiple buses R1. As a result, the Examiner has not established a prima facia case of obviousness.

Thus, in view of the above, claim 15 is patentable over Gens in view of Bass and the APA. In addition, claims 19 and 22-23 depend from claim 15 and, as a result, are patentable over Gens in view of Bass and the APA for the same reasons as claim 15.

The Examiner additionally rejected claims 17-18 and 20-21 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of Bass Jr. et al., the admitted prior art (APA) as applied to claim 15 above, and further in view of Rao. For the reasons set forth below, applicant respectfully traverses this rejection.

As discussed above in the rejection of claim 15, Gens, Bass, and the APA do not teach or suggest a plurality of positive lines. In addition, applicant has been unable to find any discussion in Rao that teaches or suggests the plurality of positive lines required by claim 15.

Thus, claim 15 is patentable over Gens in view of Bass, the APA, and Rao. Since claims 17-18 and 20-21 either directly or indirectly depend from claim 15, these claims are also patentable over Gens in view of Bass, the APA, and Rao.

The Examiner rejected claims 1, 5-6, 10-11, 15, 17-23, and 32-36 under 35 U.S.C. §103(a) as being unpatentable over Gens et al. in view of Bass Jr. et al., the admitted prior art (APA) as applied to claim 15 above, and further in view of Rao and Ker (U.S.

Patent No. 5,744,842). For the reasons set forth below, applicant respectfully traverses this rejection.

Claim 1 recites, in part,

> "a well of a second conductivity type formed in the substrate, [and]
> "a plurality of spaced-apart first regions of the first conductivity type formed in the well."

As noted above, Gens in view of Rao and Gens in view of Bass and the APA fail to teach or suggest the diode limitations required by claim 1. Thus, Gens in view of Rao, Bass, and the APA also fail to teach or suggest the diode limitations required by amended claim 1.

In rejecting the claims, the Examiner pointed to Ker as teaching the claimed structure of the diode. Specifically, the Examiner pointed to n-well 312 in FIG. 15 of Ker as constituting the well of claim 1, and p+ regions 300 in FIG. 15 of Ker as (presumably) constituting the plurality of first regions of claim 1.

At column 10, lines 29-31, Ker teaches that FIG. 15 shows a layout of the device structure shown in FIG. 14. As shown in FIG. 14, however, Ker teaches that none of the p+ regions 300 are formed in n-well 312 as required by claim 1.

As a result, claim 1 is patentable over Gens in view of Rao, Bass, the APA, and Ker. In addition, since claims 5, 6, 32-36, and new claim 37 depend directly or indirectly from claim 1, these claims are patentable over Gens in view of Rao, Bass, the APA, and Ker for the same reasons as claim 1.

Claim 10 recites, in part,

> "a first region of a second conductivity type formed in the well, [and]
> "a plurality of spaced-apart second regions . . . formed in the first region." [Bracket added.]

In rejecting the claims, the Examiner pointed to n-well 312 in FIG. 15 of Ker as constituting the well of claim 1, and p+ regions 300 in FIG. 15 of Ker as (presumably) constituting the plurality of second regions of claim 10. The Examiner also pointed to FIG. 9 of Rao as teaching a first region (n-well 111) that is formed in a well (n+ buried layer 108).

Applicant respectfully does not understand the Examiner's argument with respect to FIG. 9 of Rao. The Examiner appears to be arguing that it would be obvious to form an n-type region in n-well 312 of Ker. However, Ker teaches in FIG. 14 that an n-type region, namely region 304, is formed in n-well 312.

As noted above and as shown in FIG. 14 of Ker, however, p+ regions 300 are not formed in n-type region 304 or n-well 312. In addition, as noted above and as shown in FIG. 9 of Rao, n-well 111 is not formed in n+ buried layer 108.

As a result, claim 10 is patentable over Gens in view of Rao, Bass, the APA, and Ker. In addition, since claim 11 depends from claim 10, this claim is patentable over Gens in view of Rao, Bass, the APA, and Ker for the same reasons as claim 10.

With respect to claim 15, the Examiner argued that Gens, Bass, and the APA teach substantially the entire claimed structure as applied to claim 15. As noted above, however, claim 15 is patentable over Gens, Bass, and the APA.

Further, applicant has been unable to find any discussion in Ker or Rao that teaches or suggests a plurality of ESD positive lines as required by claim 15. As a result, claim 15 is patentable over Gens in view of Rao, Bass, the APA, and Ker. In addition, since claims 17-23 depend directly or indirectly from claim 15, these claims are patentable over Gens in view of Rao, Bass, the APA, and Ker for the same reasons as claim 15.

Thus, for the foregoing reasons it is submitted that all of the claims are now in a condition for allowance. Therefore, the Examiner's early re-examination are reconsideration are respectively requested.

Respectfully submitted,
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